PATENT SPECIFICATION

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(19) 

(54) SWITCH MACHINE WITH INTERNAL LOCKING

(71) We, INTERNATIONAL STANDARD ELECTRIC CORPORATION, a Corporation organised and existing under the Laws of the State of Delaware, United States of America, of 320 Park Avenue, New York 22, State of New York, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to a railway switch machine with internal locking.

The requirements placed on switches regarding trailability are very different in the individual countries. In the Federal Republic of Germany, unlike in most other countries, trailable switches are used. For reasons of manufacture, export, and rationalisation, it is desirable to have a uniform design principle of a switch machine with internal locking and which can provide for trailable or non-trailable operation.

According to the invention there is provided a railway switch machine of the type having internal locking and having a spring box for transmission of the throwing force, wherein there are provided two throw rods for the throwing process, wherein the spring box is non-positively connectable, via a spring-loaded roller, with a corresponding depression in a shoe located between the throw rods, wherein the shoe has two elongated slots each of which is engaged by a driving pin provided on a respective one of each of the two throw rods, wherein each said throw rod has a recess for engaging a locking bar, and wherein the trailable or non-trailable operation of the switch machine is determined by the lengths of the slots in the shoe and by the shape of the recess in each said throw rod.

In one application, for realizing a trailable switch machine, the recess in the throw rod is bevelled opposite the direction of movement of the throw rod during the trailing process, thus permitting the locking bar to be lifted. The elongated slots in the shoe are at least so long that the throw rod does not act on, and take along, the second throw rod via the driving pin of this rod until after the locking bar has been lifted completely. For realizing a non-trailable switch machine, the recess in the throw rod is bevelled only in part, and the slots in the shoe are at least as long as the bevelled portion of the recess.

An embodiment of the invention will now be described with reference to the accompanying drawings, in which:

Fig. 1 is a perspective schematic view of those parts of the switch machine which are essential to the invention;

Figs. 2*a* to 2*c* are sectional and top views of the switch machine during the throwing process;

Figs. 3*a* to 3*c* are sectional and top views of the switch machine during the trailing process;

Figs. 4*a*, 4*b* show the throw-rod recess in the switch machine without the trailable feature, and

Fig. 5 shows the spring box and the switching from "trailable" to "non-trailable."

The schematic, perspective view of Fig. 1 shows the essential parts of the switch machine with their functional assignments: two throw rods 2 and 2′ for throwing the switch, a shoe 7 between the throw rods 2 and 2′, and a spring box 4 (shown only partly, cf. Fig. 2) which embraces the shoe 7 and the throw rods 2, 2′ and to which the throwing force is applied. Each of the throw rods 2, 2′ has a driving pin 8, 8′ which fits into a corresponding slot L, L′ of the shoe 7. A roller 6 is forced into a corresponding depression in the shoe 7 by a spring in the spring box 4. Thus, a non-positive connection is established between the spring box and the throw rods by means of the roller 6, the shoe 7 and the driving pins 8, 8′. Locking bars 9 and 9′ (not shown in Fig. 1) serve to safeguard the throwing

process; they engage with corresponding recesses of the throw rods 2, 2', which must be unlocked before a throwing movement can take place. Of special importance for the trailing process are the shape of the recess of the throw rod 2 (assumed to be connected with the distant switch blade in this example) and the slots L and L'. Fig. 1 shows the trailable version of the switch machine, this can be recognized by the bevelled recess of the throw rod 2. When the switch is trailed, the throw rod 2 is forced backwards (arrow A), with the locking bar 9 being pushed away (arrow B); at the same time, the driving pin 8 in the oblong hole L travels backwards. When the locking bar 9 has been completely lifted, the driving pin reaches the end of the oblong hole L and now acts on the shoe 7; the retaining force of the spring acting on the roller 6 is overcome, and the roller 6 is moved out of the depression; the shoe 7 then takes along the throw rod 2' via the driving pin 8' of this throw rod, because the latter, too, has been unlocked by the locking bar 9. Both throw rods thus move backwards (arrow A) and safeguard the trailing process.

In the non-trailable design, the recess in the throw rod 2 is bevelled only in part (cf. Figs. 4a, 4b), and the oblong holes L are as long as the bevelled portion of the recess. When the switch is trailed, the locking bar 9 is lifted only partly (this can be used to transmit a trailing message). When the locking bar 9 reaches the end of the bevelled portion and, consequently, the driving pin 8 reaches the end of the oblong hole L, no further backward movement is possible, and the machine remains locked through the locking 9, 9'.

Figs. 2a to 2c show the throwing process in three "instantaneous shots"; each of the figures shows the switch machine in a section and in a top view.

In addition to the essential parts described in connection with Fig. 1, the following parts are shown: a machine housing 1, the second locking bar 9', detector rods 3, 3' and locking noses 10, 10' which are shaped so as to be capable of passing the locking bars 9, 9' in the lifted condition, while otherwise being retained by these locking bars. These figures show how the spring box 4 embraces the two throw rods 2, 2' and the shoe 7.

Fig. 2*a* shows the position of the parts of the switch machine prior to the throwing process. The locking bar 9 locks the throw rods 2, 2' and holds the spring box in place via the locking nose 10. A force PV shifts the locking bar 9 so as to unlock the throw rods 2, 2'. The force PV is preferably a hydraulic force.

Fig. 2b shows the position of the parts of the switch machine at an instant during the throwing process. The throw rods 2, 2' have been unlocked, and the throwing force P1, applied via the spring box 4, shifts the two throw rods 2, 2' through the non-positive connection via the roller 6, the shoe 7, and the driving pins 8, 8'. The force P1 is preferably a hydraulic force.

Fig. 2c shows the end positions of the parts of the switch machine after the throwing process. After the locking nose 10' has passed the locking bar 9', the force F' of a pretensioned spring acts on the locking bar 9' and shifts this locking bar to lock the throw rods and the locking nose 10' of the spring box. The dropping-in of the locking bar 9' oerates, in known manner, a contact which disconnects the throwing hydraulic supply. This completes the throwing process.

Figs. 3*a* to 3*c* show three stages of the trailing process, again in sections and top views. Fig. 3*a* differs from Fig. 2*a* only in that, for initiating a trailing process, instead of the hydraulic throwing forces PV and P1, a pushing force P acts on the throw rod 2. Fig. 3b shows the positions of the parts after the roller 6 has been lifted out of the associated depression in the shoe 7. The roller 6 can be lifted precisely when the pushing force P acting on the rod 2 exceeds a set retaining value. This severs the non-positive connection between the spring box 4 and the throw rods 2, 2'.

From the positions of the driving pins 8, 8', it can be seen that the force P takes along the throw rod 2' via the throw rod 2; this can also be seen from the changed positions of the recesses in the throw rods. The spring box 4 remains in its original position, because the hydraulic power system of the switch machine is not influenced by the trailing process.

Fig. 3c shows the end positions of the throw rods 2, 2' after the trailing process; to throw the switch back to its normal position, the hydraulic drive is now operated as in the normal throwing process, whereupon the spring box 4 follows the rods, and the roller 6 moves up the shoe 7 and finally engages with the depression again, whereby the non-positive connection between the throw rods 2, 2' and the spring box 4 has been reestablished.

Figs. 4*a* and 4*b* are top views of the throw rod recess in a switch machine without the trailable feature.

Fig. 4a shows the locking bar 9 in the engaged condition; the pushing force 4 tries to push the throw rod 2 away. The result is shown in Fig. 4b; the locking bar 9 has been lifted by the bevelled portion of the recess, but is blocked by the vertical portion of the recess. Thus, a trailing process is initiated, and the movement of the locking bar 9

causes the transmission of a trailing message, but all throw rods 2, 2' and detector rods 3, 3' remain locked, and the trailing process described with reference to Figs. 3a to 3c cannot take place.

The switch machine may be adapted to trailable or non-trailable operation by the design of the recesses in the throw rods.

If the switch machine is made trailable, i.e. with the recess in the throw rod 2 bevelled as shown in Fig. 1, there is another possibility of switching the switch machine to "non-trailable" if required.

This is shown in Fig. 5. By means of a selectively operable latch 11, the upward movement of the roller 6 can be limited. Thus, the non-positive connection is retained; the locking bar 9 is not lifted completely, and the entire drive remains locked. In this case, too, the initiation of a trailing process is permitted in order to obtain a safe trailing message shortly before blocking.

WHAT WE CLAIM IS:—

1. A railway switch machine of the type having internal locking and having a spring box for transmission of the throwing force, wherein there are provided two throw rods for the throwing process, wherein the spring box is non-positively connectable, via a sring-loaded roller, with a corresponding depression in a shoe located between the throw rods, wherein the shoe has two elongated slots each of which is engaged by a driving pin provided on a respective one of each of the two throw rods, wherein each said throw rod has a recess for engaging a locking bar, and wherein the trailable or non-trailable operation fo the switch machine is determined by the lengths of the slots in the shoe and by the shape of the recess in each said throw rod.

2. A switch machine according to claim 1, wherein, for trailing operation, the recess in each said throw rod is bevelled opposite the direction of movement of the throw rod during the trailing process, thus permitting the locking bar to be lifted, and wherein the elongated slots in the shoe are at least so long that the throw rod does not act on, and take along, the second throw rod via the driving pin of said rod until after the locking bar has been lifted completely.

3. A switch machine according to claim 1, wherein, for non-trailing operation, the recess in each said throw rod is bevelled only in part, and wherein the elongated slots in the shoe are at least as long as the bevelled portion of the recess.

4. A switch machine according to claim 1 or 3, wherein the roller of the spring box is blocked in its upward movement during the trailing process by a latch and does not release the shoe and the throw rods.

5. A railway switch machine susbtantially as described herein with reference to the accompanying drawings.

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Chartered Patent Agent,
For the Applicants.

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8 SHEETS

COMPLETE SPECIFICATION

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Sheet 1

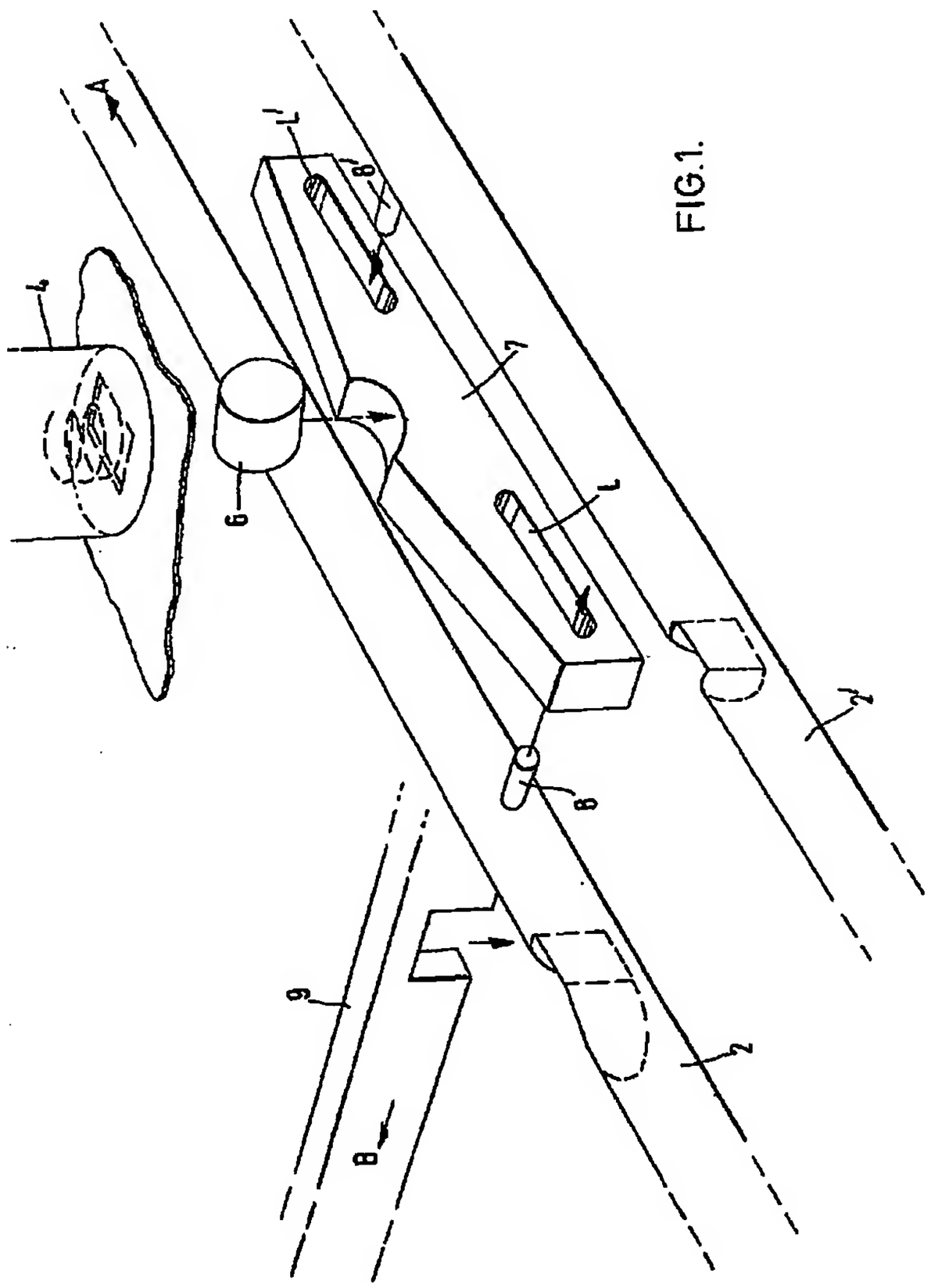

FIG.1.

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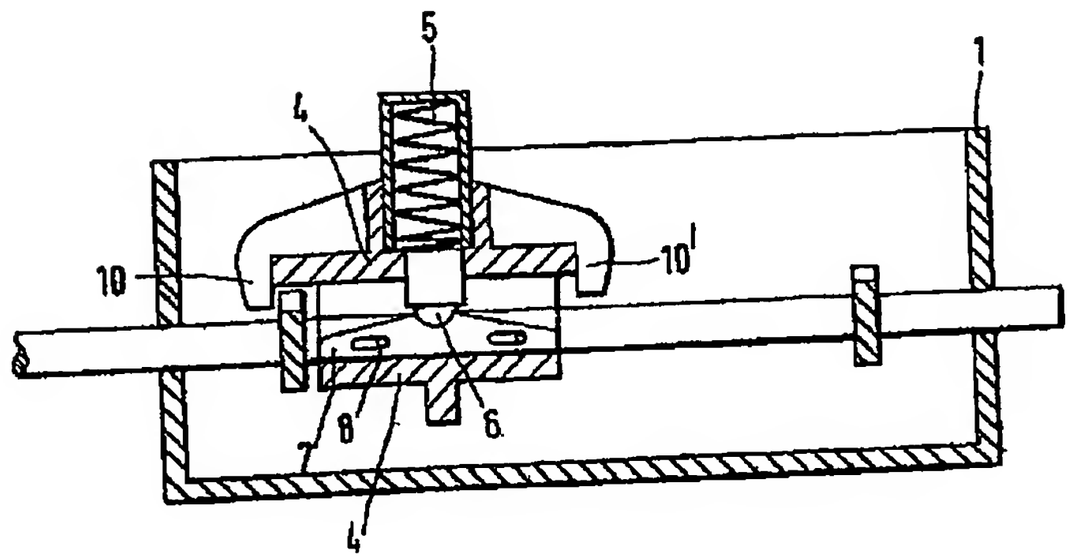
Sheet 2

FIG.2aa



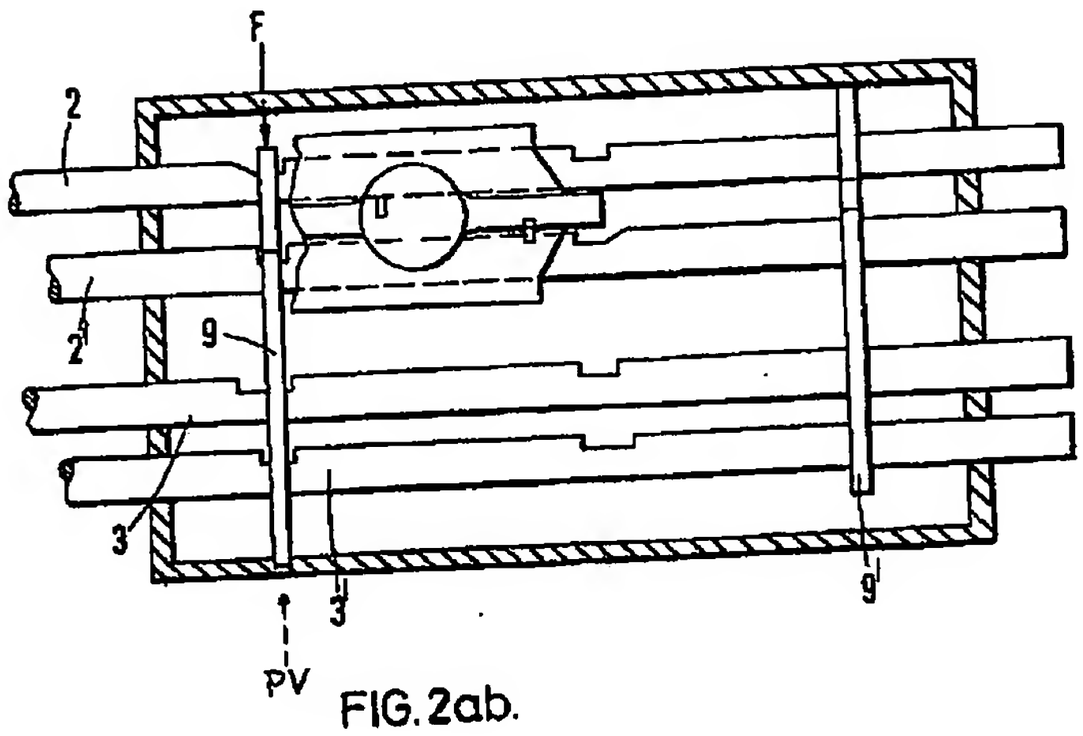


FIG.2ab.

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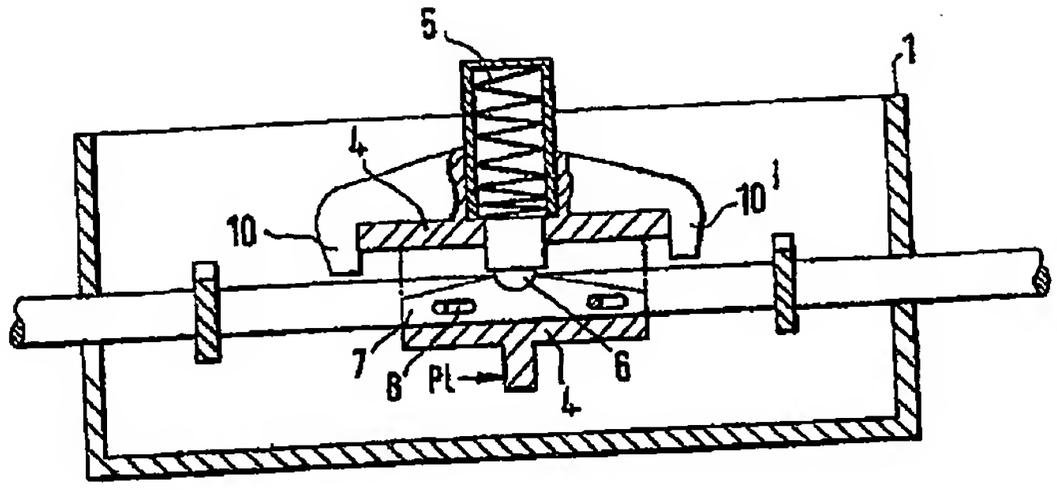
Sheet 3

FIG.2ba



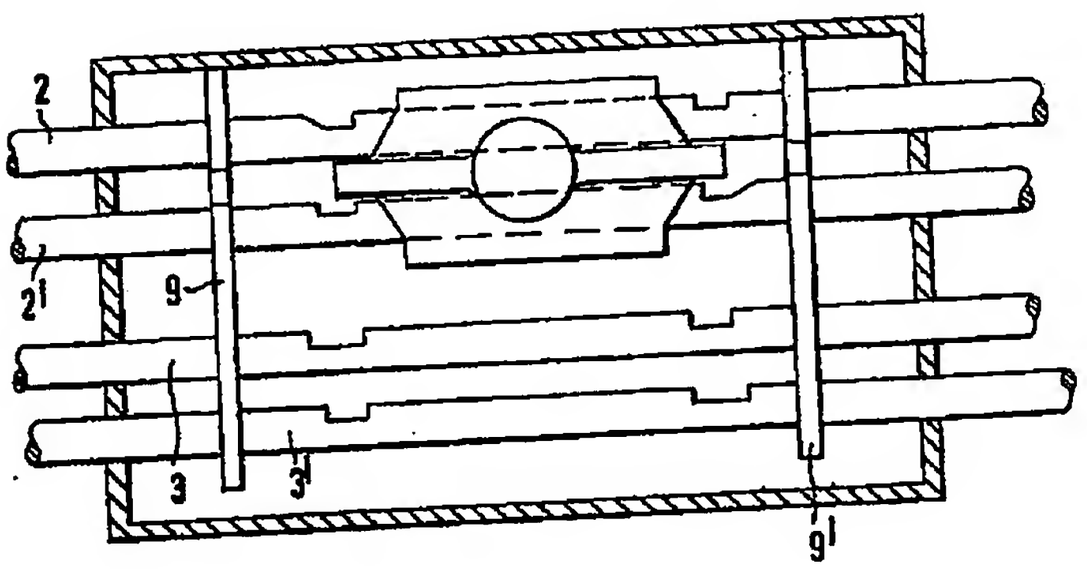


FIG.2bb.

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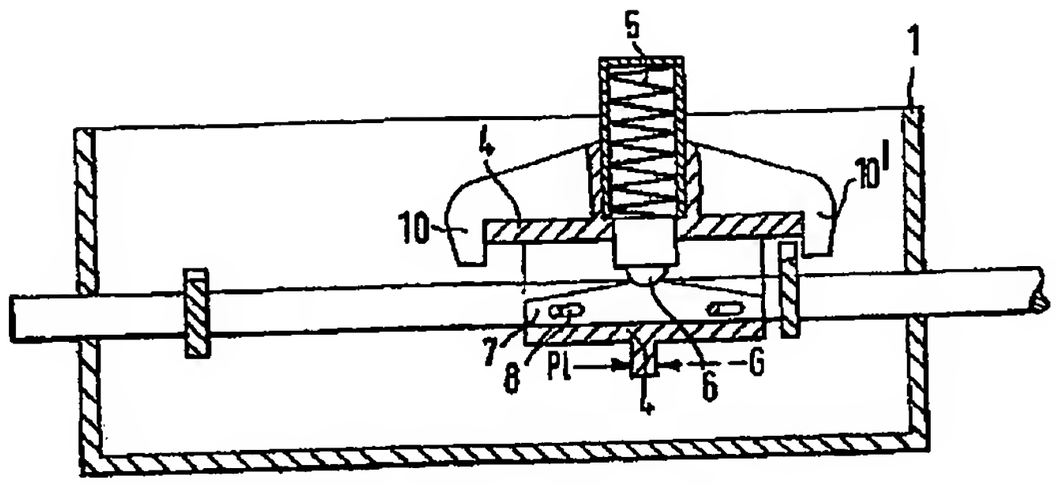
Sheet 4

FIG.2ca



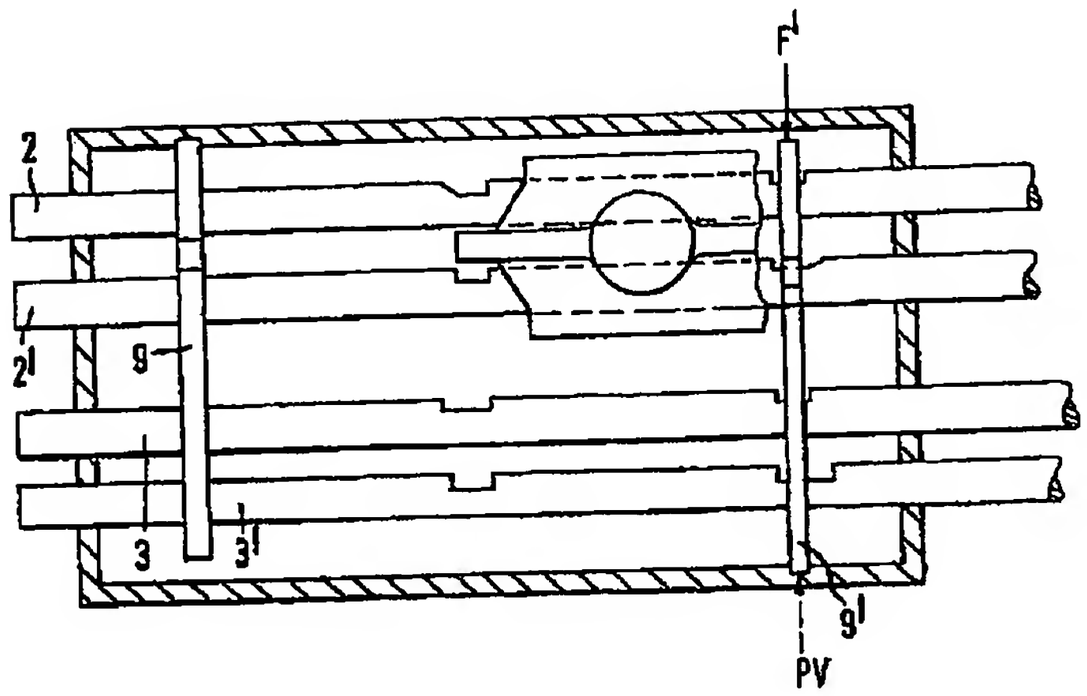


FIG.2cb.

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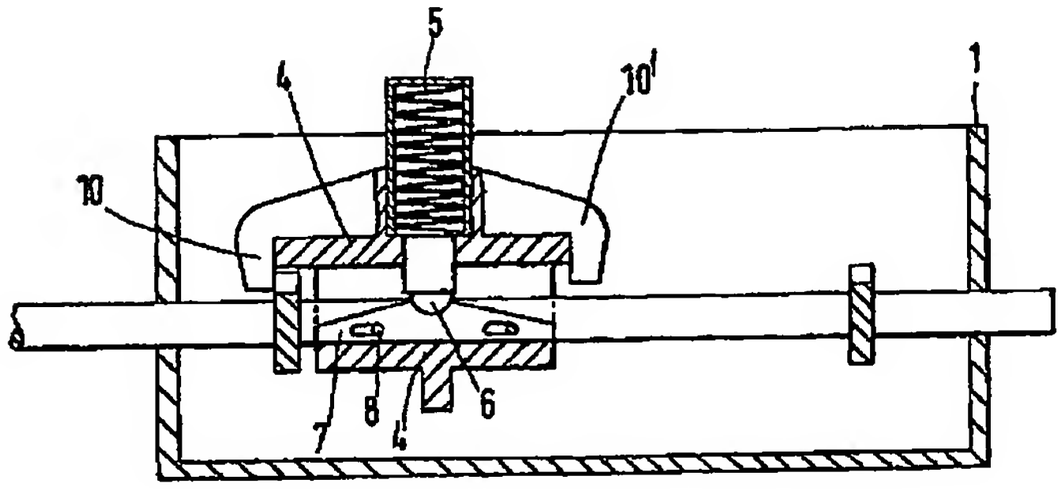
Sheet 5

FIG.3aa.



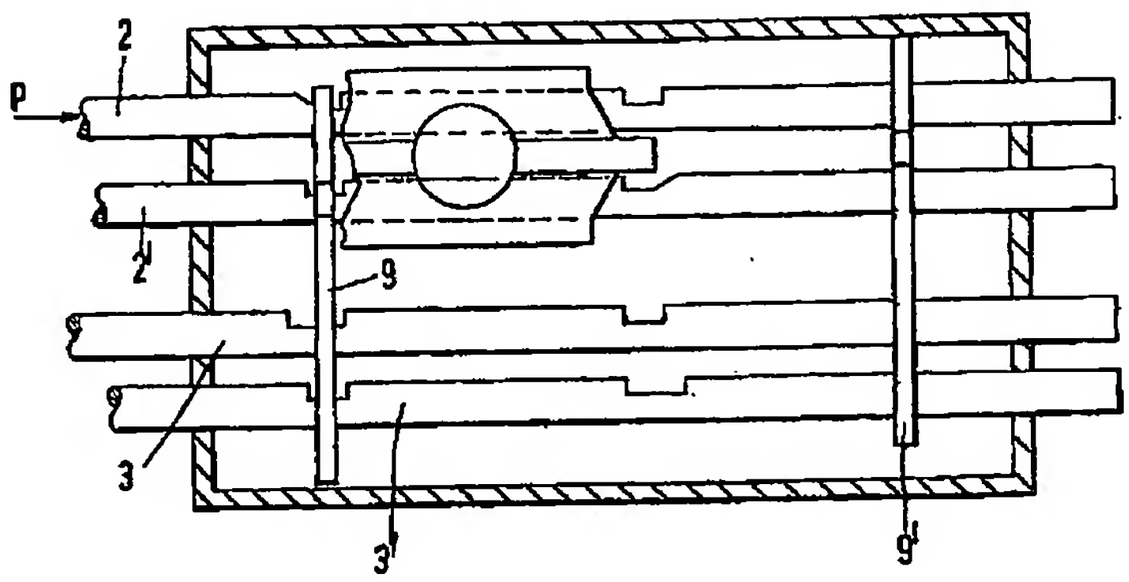


FIG.3ab.

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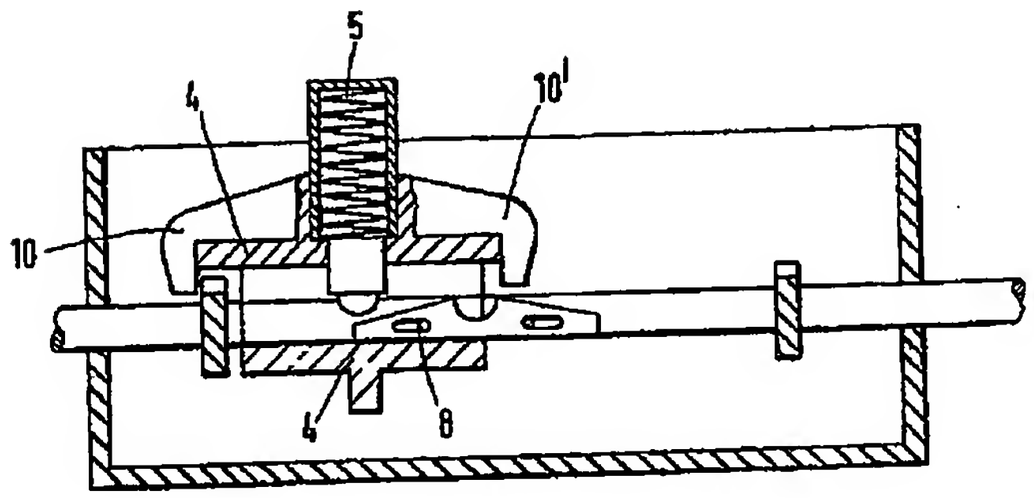
FIG.3ba.



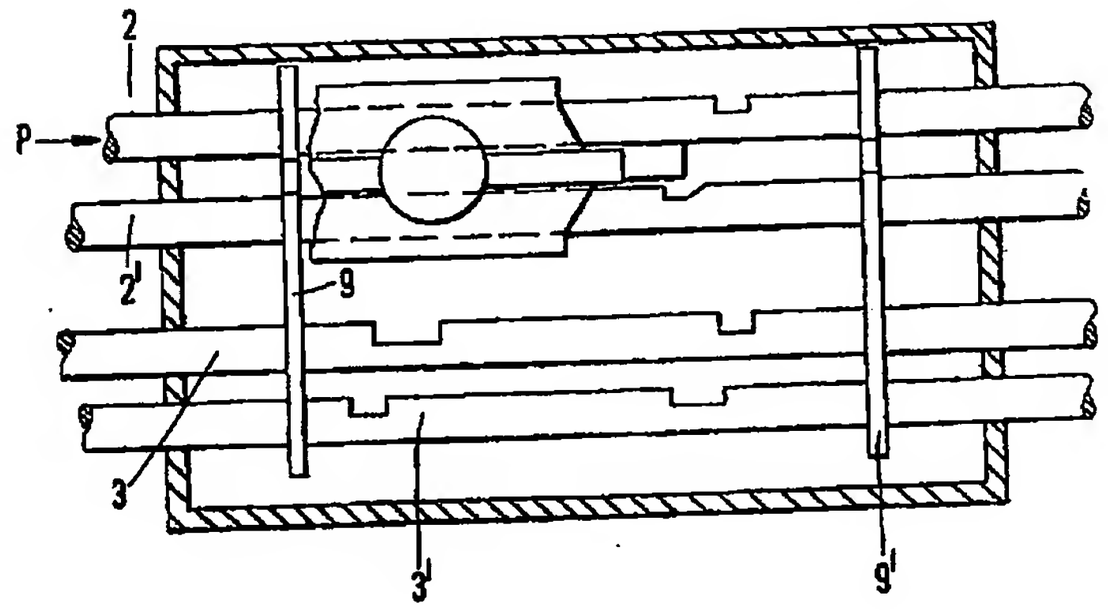


FIG.3bb.

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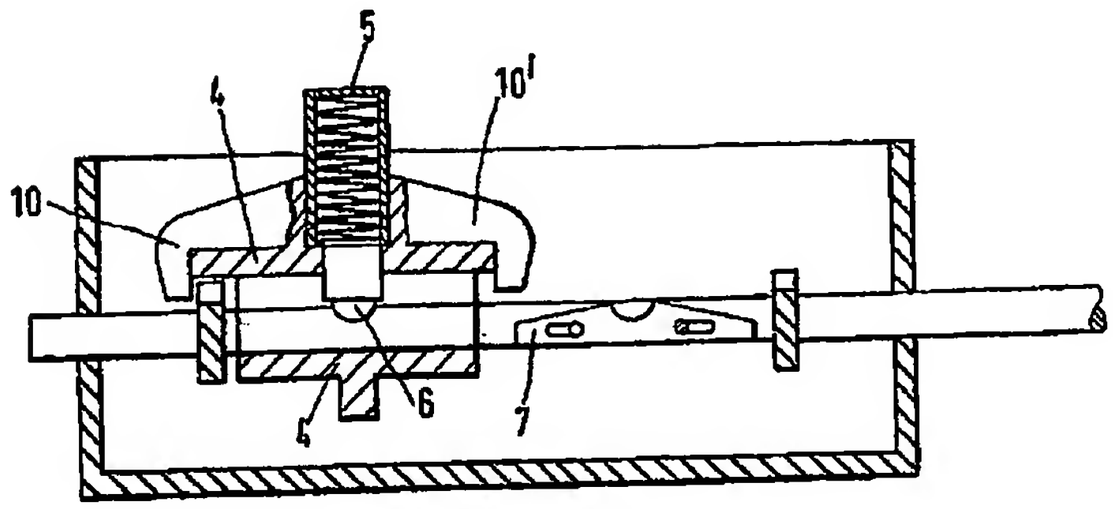
Sheet 7

FIG.3ca.



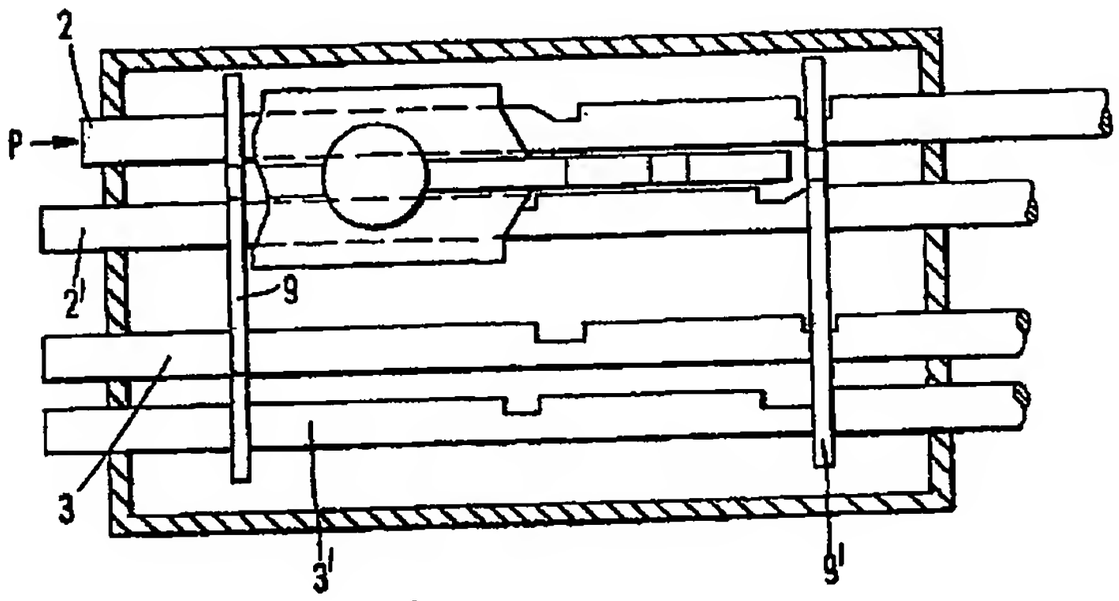


FIG.3cb.

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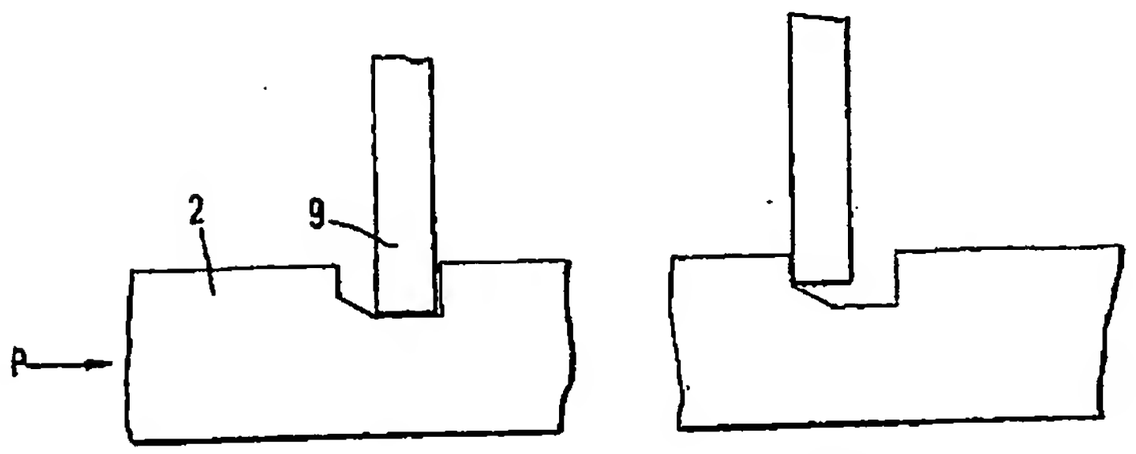

FIG.4a. FIG.4b.

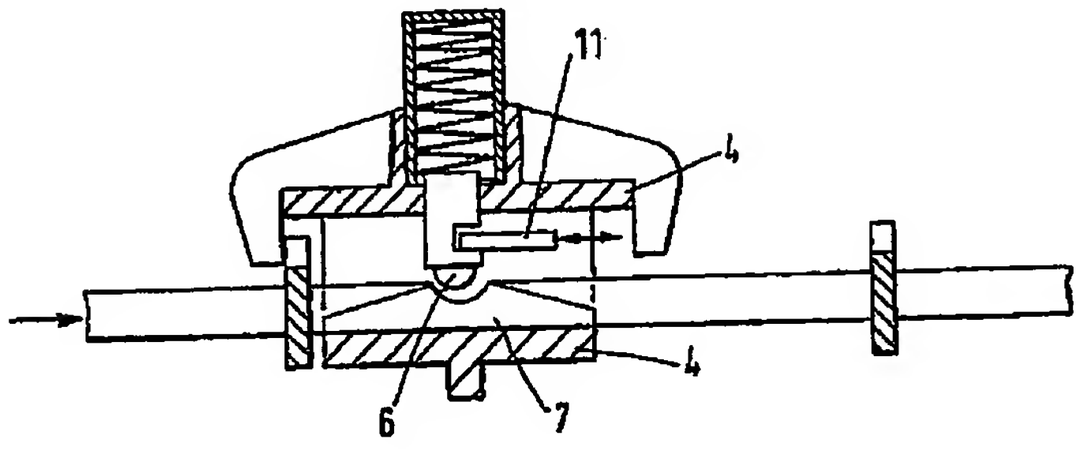

FIG.5.